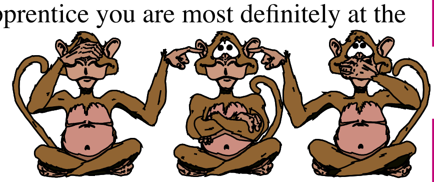
The ABC's of Diemaking & Diecutting

Article Title “The ABC's of Steel Rule Die Pressure Balancing?

Introduction

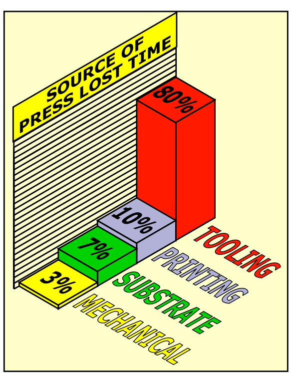
“You never will be the person you can be if pressure, tension, and discipline are taken out of your life.”

As a diemaking apprentice, I was surprised when told the first three years of my training would be spent in diecutting and the gluing and finishing. The other diecutting apprentice, who started at the same time, was equally nonplussed, when it was explained he would spend the next three years in diemaking and structural design. As a 15 year-old apprentice you are most definitely at the bottom of the food chain, and you quickly learn to hear no evil, see no evil, and speak no evil.



Eventually we discovered there was practical experience behind the decision.

Statistically, in diecutting then, as now, the primary source of press down time is associated with tool problems and issues. ***See below***. The explanation was simple. ***“How can you operate a press in which the majority of the problems occur with the steel rule die, and you do not know how to make a die, how to diagnose and fix problems?”*** My explanation was equally succinct. ***“How can you make a die, when more than 80% of the problems in diecutting are caused by these tools, without a clear understanding of how diecutting works, and how the steel rule die impacts press make-ready and production output?”***

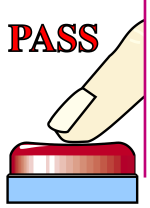


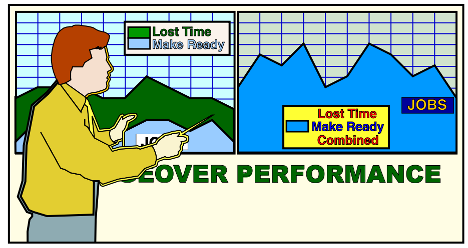
And I am sure you have guessed by now, these were not rhetorical questions!

The other element of this training system was, it recognized that the strength of the relationship between the diemaker and the diecutter and their cooperative understanding of their respective roles would form the basis for an effective partnership and for mutual success. The bottom line of this story is simple and vitally important.

The diemaker has the majority of control of make-ready and on-press performance!

Which leads to a critical question for the tool designer and for your diemaking or diecutting organization. ***“How does the diemaker know what good is, and what is required in the steel rule die for optimal on-press performance?”***

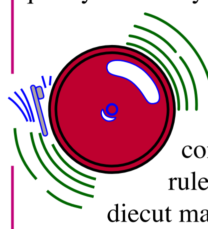




In reality the steel rule die customer is under the impression he or she is investing in precision, consistency, and repeatability, when they purchase a tool. When the diemaker accepts the order, their responsibility is to ensure the tool meets or exceeds these key requirements.

So what is the problem or the issue we face?

Although toolmaking and press technology, and materials, supplies and components have steadily improved, press changeover time, press speed and yield, process productivity and product quality have only made marginal improvement.



The stark reality of press make-ready is, the operator has few options in controlling pressure distribution, in choosing the most effective converting parameters, and in making sure the steel rule die precisely meets the needs of the process, the diecut material, the structural design, or the end use application of the diecut part. All this is controlled in the specification, the design and the fabrication of the tool.

There are three key statements contained in this introduction to the steel rule die pressure balancing discipline:

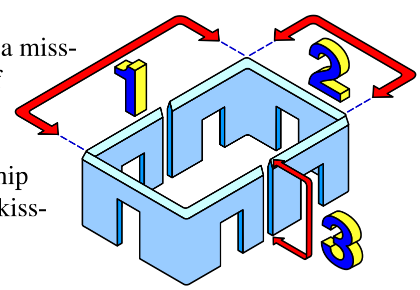
1: ***The diemaker has the majority of control of make-ready and on-press performance!***

2: ***The press is made ready when the die is specified, designed and fabricated!***

3: ***The steel rule die operates in not two, but three axis!***

What is the goal of the professional diecutter? To sell the First Impression!

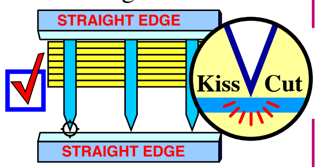
This article is a focus upon a missing and a vital ingredient of toolmaking, which enables the diemaker to forge an effective technical partnership with the diecutter, to make kiss-cut performance a reality.

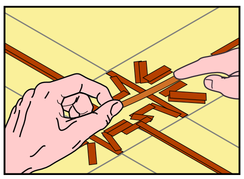


The Challenge of Platen Make-Ready?

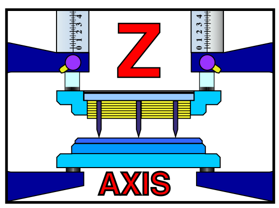
"Murphy's Law of Thermodynamics
Things get worse under pressure!"

There should be no question that the platen make-ready discipline can be a difficult challenge, But why is that? The goal is absolutely clear, to sell the first impression. Naturally, you may deem this as an unrealistic goal. But how many impressions will it take? And isn't the number of impressions required to start production a key indicator and an important measurement of organization knowledge, skill, and competence?

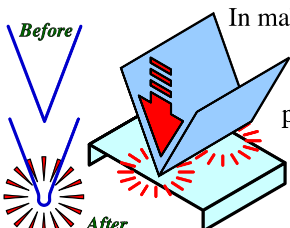




The goal of press make-ready is fast predictable set-up, primarily build around optimal kiss-cut performance, ***see above***, and secondarily, precise cutting without over-pressurization of the steel rule die. Although a fast make-ready is possible with using excess pressure, the resulting damage to the steel rule die simply generates unstable cutting performance, and repeated and excess down time, in fine-tuning/patching throughout the production cycle. ***See above***. In addition, unbalanced steel rule knife damage, which is the standard result of the majority of press make-ready, results in inconsistent diecut part quality, poor repeatability from part to part, increased nicking, slow speed, excess waste, and low yield.

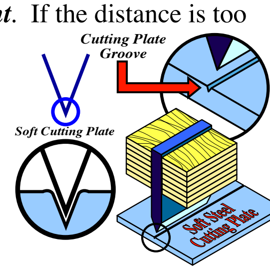


This inevitably results in dust and loose fiber, flaking and edge chipping, and inconsistent and incomplete cutting performance.

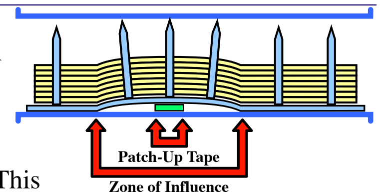


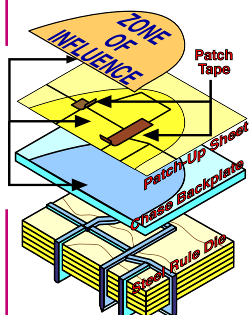
In make ready we tend to use the term pressure, as this is the primary indicator of the process. However, when we add pressure, we are simply reducing the distance between the upper tool and the lower anvil. ***"Pressure in diecutting is simply the measurement of the resistance of a specific material to the converting action of a steel rule die."***

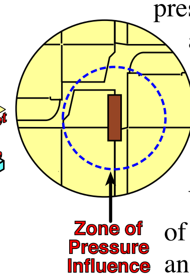
The most difficult challenge in make-ready is precisely setting the original gap between the steel rule die and the cutting anvil. This is called the Z-Axis. ***See above right***. If the distance is too narrow, the steel rule knife cutting edges are badly damaged, ***see above left***, or the die creates deep grooves in the soft cutting anvil. ***See right***. Either option is ultimately destructive and non-productive, as we are forced to use patch-up to compensate.



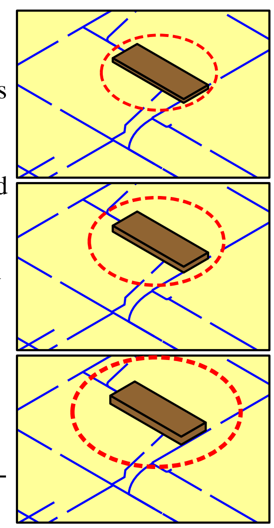
The problem with patching is it is a shimming process, which deforms the steel rule die, to affect and area much larger than the specific knife, which was being adjusted. ***See right***. This is called the Pressure Zone or the Zone of Influence in diecutting. This simply means that for every piece of patch-up tape applied to the patch-up sheet, the effect is 10 to 20 times larger that the piece of tape, ***see left***, depending upon the thickness of the tape applied. ***See below right***. This means that patch-up tape applied to increase pressure on a single knife, also adds pressure to every other knife in the vicinity of the original knife. In other words, when fixing one problem, you inevitably destabilize another part of the steel rule die and create another patch-up problem.





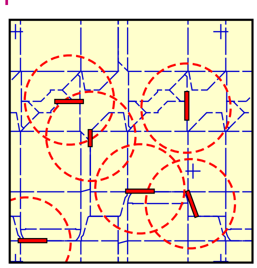


This is particularly evident when you examine a patch-up sheet and show the invisible, but very real, overlapping zones of influence. ***See below***. It is also important to recognize that most dies are not just cutting, but also creasing, scoring and perforating. Although these additional converting activities are not the focus of the cutting make-ready, they are certainly impacted and destabilized by unbalanced patching.



These are the technical challenges the diecutter faces, but these are integrated with no less important commercial expectations in every make-ready?

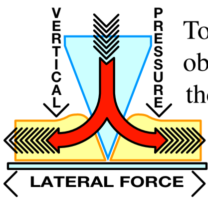
Speed and costs are the driving forces which must be factored into measurement and assessment of on-press performance. Is make-ready performance getting faster or slower? Is the resulting production run faster, with lower waste and greater yield? Are we gaining knowledge and experience from each changeover cycle? Are we developing better and more effective standard operating procedures, which enable make-ready simplification, activity streamlining, and progressively higher benchmarked standards?



We know from the results we generate, that the way we are currently executing patch-up is not the most effective, so how should we change on-press performance, through more effective specification, design and fabrication of a steel rule die?

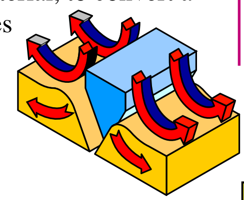
Where Does Pressure Come From in Platen Diecutting?

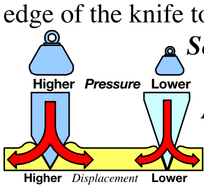
"Courage is grace under pressure." Ernest Hemmingway



To solve the cutting make-ready problem it is obviously important to understand the cause and the sources of an inherent pressure imbalance.

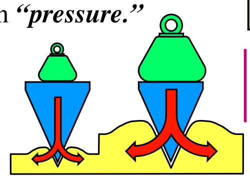
The first issue we must address is the Displacement Force generated through the bevels of the blade to convert a vertical force into a lateral splitting/tearing action. ***See above***. While it is common to define diecutting as a cutting process, it is vital to understand that diecutting is the action of driving a wedge/knife into a material, to convert a reciprocating stroke into a push at right angles to the centerline of the blade, which causes the material to rupture and split, before the edge of the knife touches the cutting plate. ***See right***.

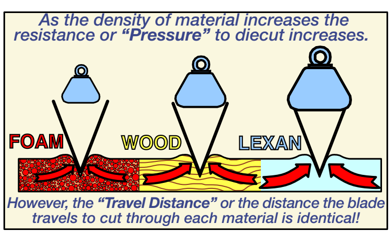




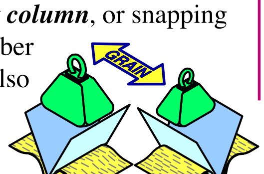
As the bevel angle is the primary splitting source it should be obvious that an increase in the bevel angle will generate greater displacement force, and therefore, greater pressure/resistance, and a decrease in the bevel angle will generate lower displacement force, and therefore, lower pressure/resistance. ***See left above***.

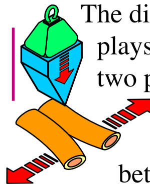
Naturally, the caliper, the density, the fiber type, and the grain direction of a material have a great impact on ***"pressure."*** As the caliper increases, the degree of displacement force increases in proportion, and greater force is required to split a material. ***See right***. An excellent example of how the density of different materials impacts ***"pressure"*** can be demonstrated when cutting three materials of the same caliper, but very different hardness and densities.

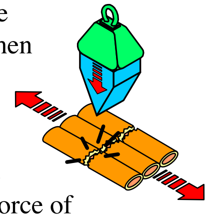




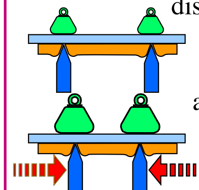
For example, although the travel or press stroke distance required to diecut a 0.010" foam, wood or lexan material is identical, the pressure, or the resistance of each material to the displacement action of the blade is very different. ***See above***. The impact of fiber type can be seen in material resistance to diecutting, as it takes more pressure to cut at right angles to the paperboard grain than it does parallel to the grain. ***See below right***. This can be simplified by examining the action of splitting between parallel fibers, ***see top of next column***, or snapping and bursting through a right angles to the fiber orientation. ***See top of next column***. This also depends upon the type of fiber, which was used in the formation of the paperboard.



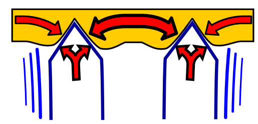


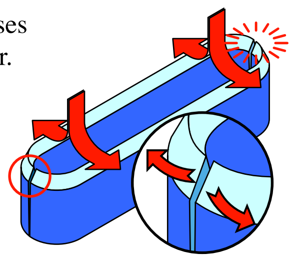


The displacement action of a cutting blade plays a critical but invisible problem, when two parallel knives are brought closer together. ***See below left***. This is because the material trapped between the inner bevels of the knives is highly resistant to the lateral compression force of displacement.

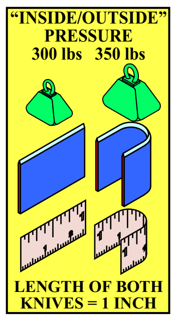


This means the knives are often forced to flex apart, ***see right***, often causing the steel rule shape to fracture and flex open, ***see below right***, and the degree of pressure increases as the knives are brought closer together.

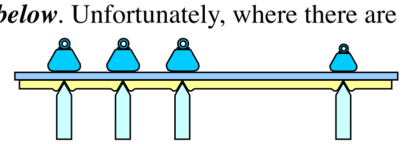


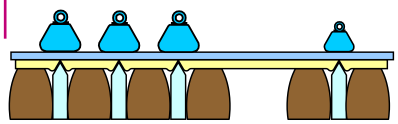


This is called ***"Inside/Outside Pressure"*** in platen diecutting because the displacement resistance ***"inside"*** an enclosed shape is often higher than the ***"outside"*** displacement force. For example, a one lineal inch of knife, which may take 300 pounds of pressure to diecut a specific material, would take more than 350 pounds if the same knife were bent into a ***"U"*** shape. ***See left***.

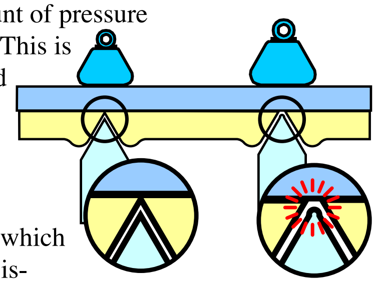


In practice, this means that in a die where there are more knives in one area of a die than another, the pressure to diecut that part of the die is higher than the area of the die with less knives. ***See below***. Unfortunately, where there are more knives there is inevitably more ejection material or rubber. And as every square inch of rubber in a steel rule die requires a minimum of 25 pounds to compress during diecutting, the higher amounts of rubber required where there is a concentration of knives in a die, simply adds to the pressure imbalance. ***See above***.



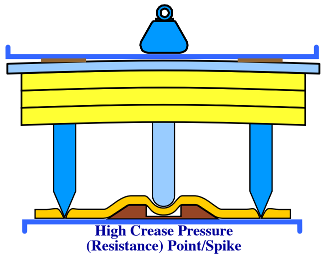


Naturally, all of these factors are based upon an assumption that the cutting edge of every knife is perfectly sharp and undamaged. If the knife is damaged or worn, it means the cutting edge is wider and ***"blunt"*** and a greater amount of pressure is required to diecut. ***See right***. This is often related to the use of a hard anvil as opposed to a softer anvil, which protects the knife-edges from damage.



There are several other factors, which can and do add compressive resis-

"What lies behind us and what lies before us are tiny matters compared to what lies within us." Ralph Waldo Emerson

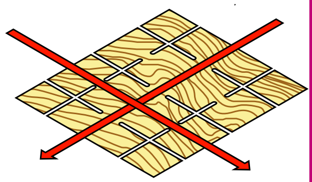


tance to a steel rule die. These can include the parameters of the creasing tool, which often generate a temporary pressure ***"spike"*** during press make-ready. ***See left***. Other factors can include a warped steel rule die and/or a domed cutting plate, and in practice if any of the sacrificial surfaces of the platen stack are damaged or are not in optimal condition, the impact on pressure distribution is always negative.

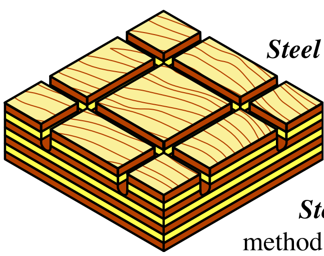
How do we begin to eliminate or compensate for these sources of pressure imbalance? There are two disciplines, which professionals use to mitigate and to minimize the potential impact of pressure imbalance. These are Steel Rule Die Calibration and Press Calibration.

What is Steel Rule Die Calibration?

"The greatest challenge to any thinking is stating the problem in a way that will allow a solution." Bertrand Russel.



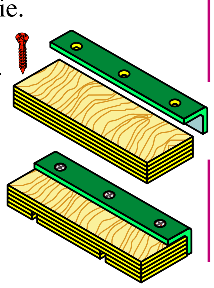
Steel Rule Die Calibration is a method of tool specification, design and fabrication, which anticipates the key challenges of press make-ready, and minimizes pressure distribution problems, and which precisely matches tool parameters and tolerances to the specific diecutting application.



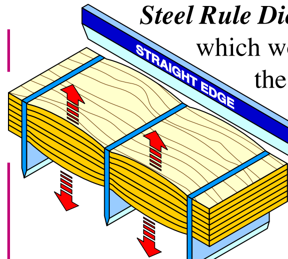
Steel Rule Die Calibration is a method of linking key tool attributes to match the kiss-cut make-ready goal of the diecutter.

Steel Rule Die Calibration is a method of tool specification and design, which ensures the parameters and settings of the male steel rule die, match and compliment the parameters and settings of the female creasing tool.

Steel Rule Die Calibration is a method of assembly, fabrication and ruling, which requires the tool to be clamped securely to a steel ruling table, whose flatness tolerances match the tolerances of the height of the steel rule knife used in the die.

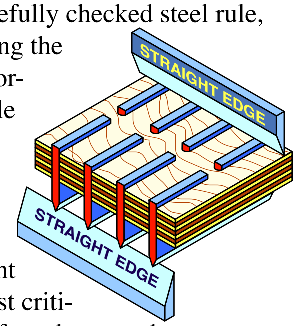


Steel Rule Die Calibration is a method of fabrication, assembly and ruling, which ensures every rule used in the die is seated in the dieboard at precisely the correct height, and seated in a dieboard which is warp and distortion free, and a steel rule die, whose settings match the kiss-cut tolerances of platen diecutting make-ready.

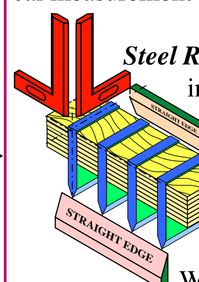


Steel Rule Die Calibration is a system of diemaking which would enable a straight edge to rest on the base of all rules in the die, and make perfect kiss-cut contact with every rule, without touching the plywood/dieboard surface.

Steel Rule Die Calibration is a method of diemaking, which ensures the finished tool utilizes verified, calibrated and carefully checked steel rule, which is capable of meeting or exceeding the tolerances the majority of die users incorrectly assume is inherent to the steel rule diemaking process.



Steel Rule Die Calibration is a method of specification, design, machining and fabrication, which uses the measurement of the finished tool's Z-Axis, as the most critical measurement in approving the tool for release to the customer.



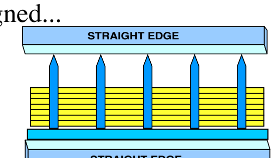
Steel Rule Die Calibration is a critical method of making the press ready by preparing the steel rule die, with a clear understanding of the challenge of press-make-ready, and how the attributes of the die must be manipulated to meet the needs of the professional diecutter.

Why is Steel Rule Die Calibration so important to the viability of the commercial and in-house diemaker?

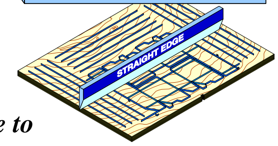
Why is Steel Rule Die Calibration so Important?

"Influence belongs to men of action, and for purposes of action nothing is more useful than narrowness of thought combined with energy of will." Henry Amiel

The manufacturing of a steel rule die is a contract between two parties in which both are inextricably linked in the mutual success of the other. This critical technical partnership is built around and is dependent on a fast, an effective, and a trouble free press-make-ready. To ensure optimal on-press performance, and outstanding diecut part quality and consistency, it is critical to learn and perfect the steel rule die calibration method of toolmaking. This is important because this discipline is designed...

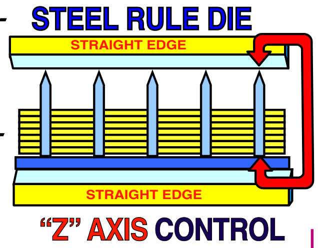


- ***To provide the diecutting customer with the best chance of success***

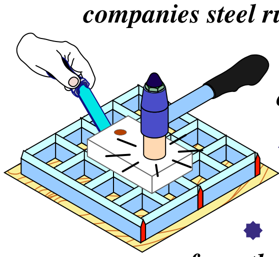


- ***To anticipate the challenge of the diecutting process and use accurate feedback from every changeover and production cycle to***

continuously improve the toolmaking process to minimize on-press problems and issues



- ***To develop a standardized system of continuously improved and benchmarked methods and practices***
- ***To minimize premature steel rule die damage and to extend the effective life of the tool***
- ***To ensure flawless on-press, kiss cut make-ready***
- ***To ensure a fast, a simple, and an effective cutting make-ready***
- ***To build a secure and an effective technical partnership with every customer***
- ***To link quality, consistency and performance with the companies steel rule dies***



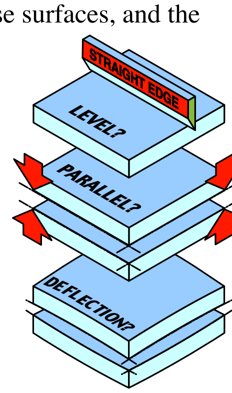
- ***To develop a reputation as a world class toolmaker***
- ***To develop outstanding customer satisfaction***
- ***To separate the diemaking company from the competition***
- ***To eliminate and mitigate commodity pricing***

This is a critical first step in ensuring the diecutter has the best chance of success, however, it is also important the diecutter is using a Calibrated Diecutting Press.

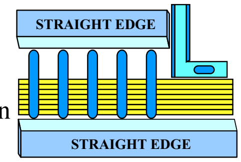
What is Press Calibration?

"The will to win is important, but the will to prepare is vital." Joe Paterno

There is a dangerous assumption, which frequently undermines performance in diecutting. Many professionals seem to believe, in the face of considerable evidence to the contrary, that the three key attributes of a effective diecutter, the flatness of the upper and lower surfaces, the parallel alignment of these surfaces, and the deflection of either or both surfaces under compressive load, are always in optimal condition.

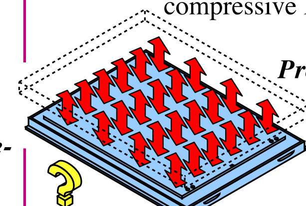


The reality is very different. Every diecutter has a distinct and an inherent pressure distribution imbalance, which significantly undermines the ability of the diecutter to generate a fast, simple and effective kiss-cut impression. The discipline of Press Calibration is used to minimize and eliminate this imbalance.



Press Calibration is the precise mapping of the Z-Axis Measurement under compressive force, to illustrate high areas and low areas in the cutting anvil.

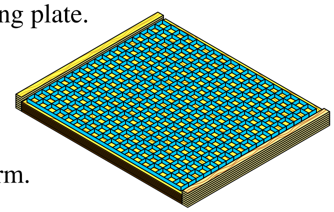
Press Calibration is a simple method of measuring the Flatness, the Parallelism, and the Deflection of the platen mechanism under compressive load.



Press Calibration is a technique designed to eliminate key variables undermining the ability to generate a kiss-cut make-ready.

Press Calibration is an essential converting maintenance action, designed to test and to compensate for deficiencies in the cutting precision of a platen diecutting press.

Press Calibration is a discipline of converting the pressure, mapping image into a compensation underlay, which is made from industrial grade foil, and which is permanently inserted into the platen stack, usually under the cutting plate.



Press Calibration is a sound, a simple, and an effective technique designed to generate a stable, a precise, and a consistent cutting platform.

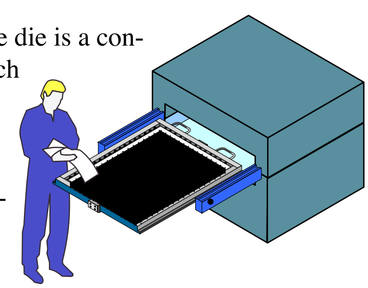
Press Calibration is a technique, which is used to compensate for the cutting variables, which frequently undermine press make-ready, production performance, and product quality and consistency.

Press Calibration is basically a press physical, which is built around a mechanical stress test.

This failure to implement this foundation and proven discipline of effective platen diecutting is the primary source of variation and difficulty in generating a fast, kiss-cut impression. Why is it so important in diecutting and in diemaking?

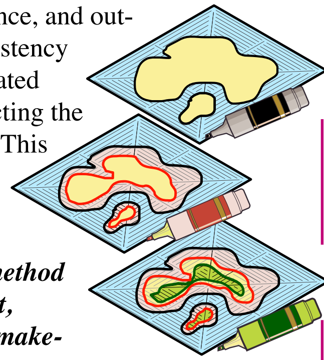
Why is Press Calibration so Important?

"Failure doesn't mean you are a failure ... it just means you haven't succeeded yet." Robert Shuller

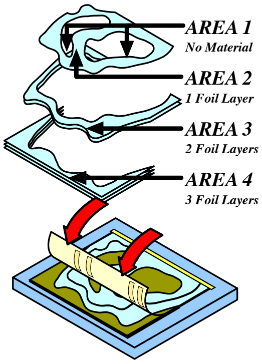


The manufacturing of a steel rule die is a contract between two parties in which both are inextricably linked in the mutual success of the other. This critical technical partnership is built around and is dependent on a fast, an effective, and a trouble free press-make-ready.

To ensure optimal on-press performance, and outstanding diecut part quality and consistency it is critical to compliment the Calibrated Steel Rule Die by learning and perfecting the technique of platen press calibration. This is important because this discipline is designed...

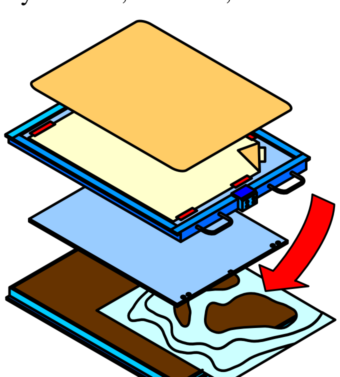


- ***To provide the only proven method to consistently generate a fast, simple and effective kiss cut make-ready***
- ***To simplify and reduce the complexity of platen press make-ready***
- ***To significantly reduce press changeover time and down time associated with patching and pressure adjustment***



- ***to minimize press mechanical and press component unbalanced wear and damage***
- ***To extend the productive life of the steel rule die***
- ***To reduce material and resource waste***
- ***To improve turnaround and increase throughput***
- ***To generate consistent quality, and exceptional diecut part repeatability***
- ***To make the transfer of one job and make-ready to another far less challenging and more efficient.***
- ***To reduce the cost of diecutting manufacturing***
- ***To generate a stable, cutting make-ready***
- ***To reduce stress and to simplify the task of the professional diecutter***

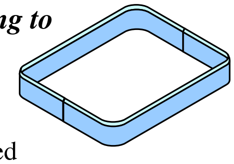
This is a critical foundation practice in ensuring the diecutter has the best chance of optimal make-ready success, however, it is also important the diecutter is matching the ***Calibrated Diecutting Press with a Calibrated Steel Rule Die***.



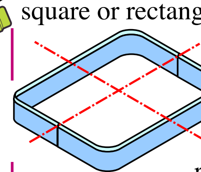
So if the press surfaces are perfectly and parallel, and the steel rule die is perfectly flat, with precise Z-Axis Control, why would pressure balancing be necessary?

Pressure Distribution versus the Design and the Layout?

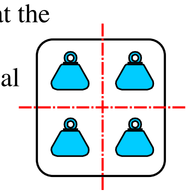
"The intelligent man is one who has successfully fulfilled many accomplishments, and is yet willing to learn more." Ed Parker

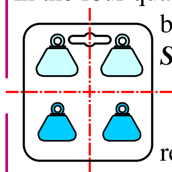


To illustrate the basic principles of pressure balancing we will use a simple round cornered square or rectangular diecut shape as our master. ***See above***.

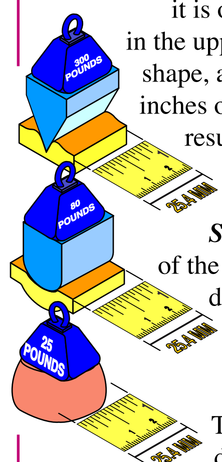


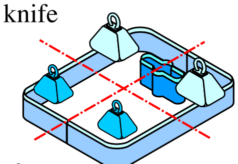
The first step in pressure balancing is to divide any shape into four quadrants. ***See left***. This provides the ability to see that the pressure or the compressive resistance of this shape is identical in the four quadrants, and the pressure would be balanced evenly across this shape. ***See right***.





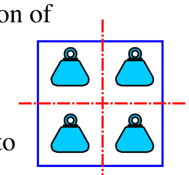
However, if we add a hanger hole to the square or rectangle, ***see left***, converting it into a Blister Card, it is obvious there is now more knife in the upper two quadrants of the shape, a greater number of lineal inches of cutting knife, and as a result, these two quadrants will require higher levels of pressure to diecut than the other two quadrants. ***See right***. This is also a good time to remind you of the standard formula for calculating pressure in diecutting. ***See left***.



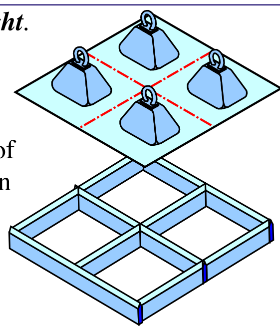


So what is the value of this information?

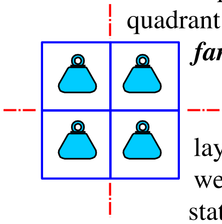
There is obviously higher pressure required to diecut the upper two quadrants, than the lower two quadrants of the blister card in the illustration above to the right. It is impossible to make any pressure adjustment on press other than a crude deformation of the die and the cutting plate using patch-up tape. And as we have already discussed patch-up is damaging and largely ineffective as a pressure adjustment device. Therefore, if we sent this die to the diecutter, the chances of achieving a successful kiss-cut impression would be zero! So clearly every design should be evaluated in terms of the pressure distribution pattern of the four quadrants of the design.



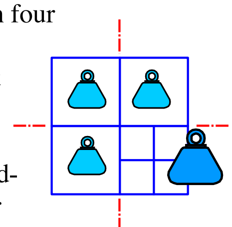
Let us examine these implications in terms of a layout of shapes in a production die. In this series we will use a simple diecut square, in which obviously the four quadrants would be identical. ***See above***. This is a simple shape and obviously diecutting this shape would be very straightforward with no pressure imbalance. In fact, even when this square is integrated into a single knife, (no double cuts), four-up or four station layout, the pressure would be evenly balanced across the entire layout. ***See right***.

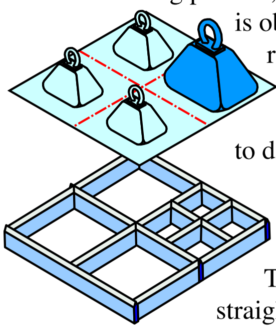


If we used the same quadrant pressure assessment for the entire layout, the results would show an identical amount of knife in each die station, and therefore, an identical amount of pressure in each die quadrant. ***See below left. So far so good!***

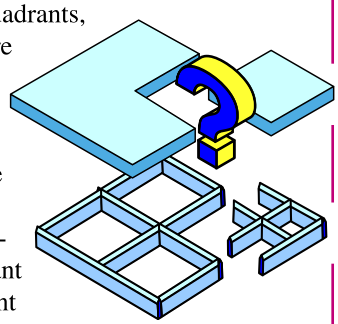


But what happens when the layout is modified? In the example ***below right***, we have removed one of the four square die stations and replaced it with four smaller squares. This very common practice of mixing two different sizes or two different shapes together would not raise any red flags in the diemaking process, but in diecutting it is obvious that one quadrant has a far greater amount of knife than the other three quadrants, and the pressure to diecut will be severely destabilized.





So how can the diecutter generate a kiss cut make-ready with this layout? The shapes are essentially simple and straightforward, but the amount of knife in one quadrant of the layout, is greater than the amount of knife in each of the other three quadrants, which will require considerably more pressure to diecut than the other three quadrants.



The only practical alternative for the diecutter is to somehow split the diecutting anvil, to separate the pressure adjustment needs of one quadrant as opposed to the pressure adjustment needs of the three other quadrants? Clearly this is a ridiculous suggestion, but is it any more ridiculous than trying to shim the tool using patch-up tape?

The practice of Pressure Balancing is the discipline of recognizing this type of imbalance, in the steel rule die specification and design phase of toolmaking, and by making appropriate adjustments, compensate for this imbalance, before the die is used in press make-ready. It was stated earlier that effective press is made-ready when the steel rule die is specified, designed, and fabricated.

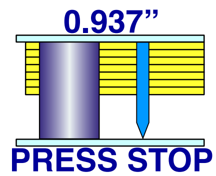
To accomplish a Pressure Balanced Steel Rule Die obviously requires making a number of changes to the components, to the parameters, and to the construction of the tool. What are the designers and diemakers options in pressure balancing the tool?

The Practice of Pressure Balancing?

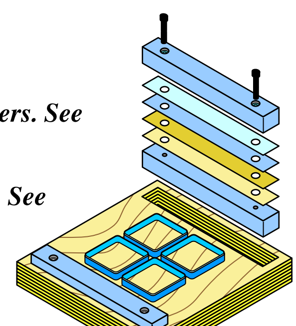
“The value of your goal, is the path you take to reach it. The rockier the path, the stronger you’ll grow. Move forward. Take action. And make it happen.”

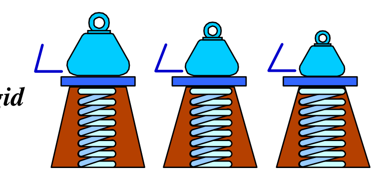
Pressure Balancing is a method of adjusting, manipulating, and mixing and matching steel rule die components, to compensate for a compressive imbalance in individual diecut part designs, and in diecut part layouts. The primary focus of this discipline focuses on the major source of compressive imbalance, the displacement action of the cutting knife bevel surfaces, however, there are a surprising and diverse range of pressure adjustment options available to the designer and to the diemaker.

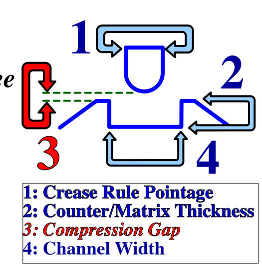
These adjustment options include ..



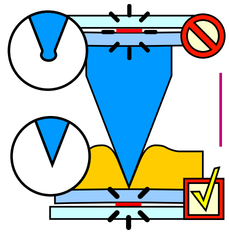
- ***The Knife Bevel Angle***
- ***The Knife Edge/Profile Type***
- ***The Pointage of the Knife***
- ***The Height of the Knife***
- ***The Height of the Plywood***
- ***The use of Press Stops & Bearers. See above.***
- ***The use of Adjustable Bearers. See right.***
- ***The (Correct) use of Leveling Knives***
- ***The use of Ejection Bearers***
- ***Ejection Height, Shape & Proportion. See below.***
- ***Ejection Durometer***
- ***Ejection Carding***
- ***Ejection Flexible & Rigid Cover Coat***
- ***Air Management - Vent or Prevent***
- ***Inside/Outside Knife***
- ***Inside/Outside Rubbering***
- ***The Crease Compression Gap. See right.***
- ***The Thickness of the Counter***
- ***The Type of Counter***
- ***The Use of Thin Plates***







- ***Implementing Two-Sheet & Combination Patch-Up***
- ***Patch-Up Sheet Location. See right***
- ***Setting of Original Platen Gap Percentage***
- ***The Pressure Calculation***
- ***Sequencing the use of Paperboard***



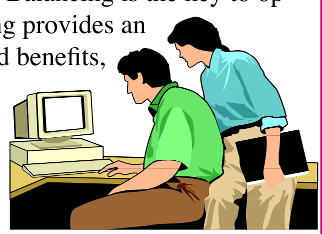
As you can see from this incomplete list of pressure adjustment options, yes, there are more techniques and tools which can be applied to this task, there are multiple options to choose from. This is of course, a double-edge sword. The flexibility a diverse range of pressure management options provides is obviously an advantage, but this poses the obvious question, which option or options is most appropriate for each specific design and die layout?

There will be a series of design and layout specific examples of how to implement pressure balancing techniques in subsequent issues of DIE - ABC Articles. But for the moment, begin by experimenting by mixing and matching knife bevel angles, and monitor and measure the results.

The Advantage of Pressure Balancing?

"Common sense is the knack of seeing things as they are, and doing things as they ought to be done." Josh Billings

While Press Calibration and Steel Rule Calibration are essential to successful platen diecutting, Pressure Balancing is the key to optimal performance. Pressure Balancing provides an extraordinary range of advantages and benefits, however, it requires a cooperative partnership between the designer, the toolmaker, and the diecutter to achieve this level of excellence.

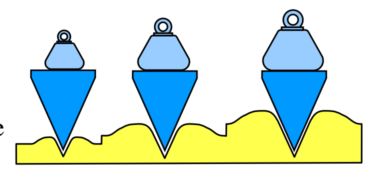


Pressure Balancing provides many different attributes to optimize on-press performance. These include the ability ...

- ***To precisely pre-calculate press tonnage, (setting the platen gap), with the ability to continually augment the pressure data base with accurate, reliable information***
- ***To achieve a faster kiss-cut, stable cutting make-ready***
- ***To generate exceptional diecut product quality and consistency***
- ***To eliminate dust & loose fiber***
- ***To develop a simpler and less complex make-ready process***
- ***To develop a system of manufacturing in which training and skill development are far easier***
- ***To reduce nicking and sheet break-up***
- ***To achieve and sustain faster press speed & greater yield***
- ***To ensure more efficient material utilization and increased throughput***
- ***To extend tool life and to reduce key press component wear and damage***

Pressure Balancing provides significant technical advantages in platen diecutting, however, the degree of benefit is related to the caliper and the density of the material. The primary focus of pressure balancing is bevel balancing, in which different knife bevels are used to regulate and control displacement force in the design and throughout the layout. As displacement is the primary generator of resistance or ***"pressure"*** it should be obvious that the benefits of pressure balancing on a material with a caliper of 0.005" or 0.127 millimeters, have far less impact than when dealing with a caliper of 0.020" or 0.508 millimeters. ***See below***.

Pressure balancing is effective in every caliper range, however the benefits have more impact as the caliper or the thickness of the material increases.



Pressure Balancing is with Steel Rule Die Calibration, the two missing disciplines of diemaking, and they represent the source of the majority of on-press problems.

Summary?

"We judge ourselves by what we feel capable of doing, while others judge us by what we have done." Henry Wadsworth Longfellow

Pressure Balancing is a profoundly important discipline in tool design, in diemaking and in diecutting, however, it is a discipline which is consistently ignored by our industry. Unfortunately, current performance standards are not commercially viable or acceptable, and the rate of process improvement throughout the industry is sadly lagging behind the speed, the performance, and the responsiveness demanded by a rapidly changing national and highly competitive global marketplace.

Diemakers consistently claim their products and services are unfairly regarded and valued as commodity items. And while I would be the first to insist the commodity classification of commercial diemaking tools and services are not entirely justified, the diemaking industry is guilty of providing the customer with tools, which generate commodity results!

Performance in diecutting and diemaking should be assessed by press make-ready, by press speed and yield, and by diecut part quality and consistency; and Pressure Balancing is the key to build productivity, profitability, and performance excellence.

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